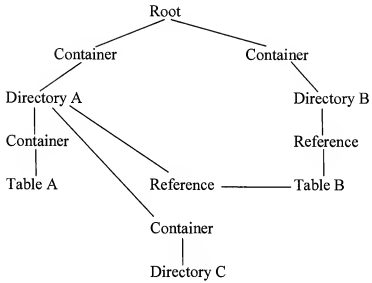
Remarks

In light of the new art being cited during the final Office Action, applicants respectfully request careful consideration of the remarks presented below and allowance of all pending claims. Claims 1-33, 36-47 and 49-51 remain pending.

In the final Office Action, dated April 6, 2006, claims 1-10, 21, 23, 36, 47 and 49-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman et al. "Efficient Locking for Concurrent Operations on B-Trees" (hereinafter Lehman); claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman in view of Soltis et al. (U.S. Patent No. 6,493,804); claims 11-14, 24-27 and 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman in view of Shaughnessy (U.S. Patent No. 5,555,388); and claims 15-20, 28-33 and 41-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman in view of Annevelink (U.S. Patent No. 5,448,727). Applicants respectfully, but most strenuously, traverse these rejections for the reasons herein.

In one aspect, applicants' invention is directed to the efficient locking of resources of a global data repository. A locking facility is provided that enables concurrent access to a complex data structure, while minimizing the lock acquisition necessary to access a particular resource of that complex data structure. As one example, the complex data structure is a data repository that includes a plurality of resources (e.g., tables, directories). The repository has a hierarchical topology, and there are various relationships among the resources of the repository and the locks of the repository. As examples, the relationships of the resources may include containment-based relationships and reference-based relationships.

One example of such a repository is depicted in FIG. 4 of applicants' application and reproduced below for the Examiner's convenience.



The type of locking relationship that exists depends on the particular relationship between the resources. For example, if the relationship between the resources is a containment-based relationship, then the locking acquisition is referred to as chained locking. On the other hand, if the relationship is a reference-based relationship, then the locking acquisition is referred to as a reference-based locking strategy.

To minimize the locking needed, the locking strategy selected for a particular resource depends on the relationship between the resource and at least one other resource. For example, if Table A is to be locked, and since Table A has a containment-based relationship, a chained locking acquisition is used. In contrast, if Table B is to be locked, and since Table B has a reference-based relationship, then a reference-based locking strategy is used, as one example.

In one particular example, applicants claim a method of managing the locking of resources of a data repository (e.g., independent claim 1). The method includes, for instance, determining whether a relationship between one resource and another resource of a data repository is a containment-based relationship or whether the relationship is a reference-based relationship, wherein the data repository includes a hierarchical structure of a plurality of resources, the hierarchical structure including one or more resources having a reference-based relationship and one or more resources having a containment-based relationship; locking at least one resource of the one resource and the another resource using one type of locking strategy, in response to the determining indicating the relationship is a containment-based relationship; and

locking at least one resource of the one resource and the another resource using another type of locking strategy, in response to the determining indicating the relationship is a reference-based relationship.

Thus, in one aspect of applicants' claimed invention, a determination is made as to whether the relationship between resources is a containment-based or a reference-based relationship. Then, in response to the determining indicating that the relationship is a containment-based relationship, at least one resource is locked using one type of locking strategy. Further, in response to the determining indicating the relationship is a reference-based relationship, at least one resource is locked using another type of locking strategy. This is very different from the teachings of the references, either alone or in combination.

For example, while Lehman describes locking for concurrent operations on B-trees, Lehman fails to describe, teach or suggest one or more aspects of applicants' claimed invention. For instance, there is no description, teaching or suggestion in Lehman of determining whether a relationship between one resource and another resource is a containment-based relationship or whether the relationship is a reference-based relationship. There is no discussion at all in Lehman of these different types of relationships. In particular, there is no discussion of containment-based or referenced-based relationships. Lehman does not even mention these terms. While Lehman describes a tree data structure, Lehman does not include any discussion of whether the relationships between resources in the structure are containment-based relationships or reference-based relationships. For at least this reason, applicants respectfully submit that Lehman does not describe, teach or suggest applicants' claimed invention.

Further, applicants respectfully submit that there is no teaching or suggestion in Lehman of locking at least one resource using one type of locking strategy, in response to the determining indicating the relationship is a containment-based relationship, and locking a resource using another type of locking strategy, in response to the determining indicating the relationship is a reference-based relationship. Again, there is no discussion in Lehman of containment-based or reference-based relationships. Further, there is no discussion in Lehman of locking using a strategy that is dependent on the relationship that is determined. Since this is not described, taught or suggested in Lehman, Lehman does not render obvious applicants' claimed invention.

In support for the rejection, it is indicated in the Office Action that "Lehman discloses that locks are placed by the inserter according to a well-ordering on the nodes". Applicants respectfully submit that this, however, is not a teaching or suggestion of determining whether a relationship is a reference-based relationship or a containment-based relationship and then locking based on that determined relationship, as claimed by applicants. Since Lehman fails to even mention reference-based or containment-based relationships, and does not describe locking that depends on whether a relationship is a containment-based or reference-based relationship, applicants respectfully submit that a *prima facie* case of obviousness has not been shown. There is no indication in the Office Action of where containment-based or reference-based relationships and the locking based on those relationships are described. For at least the above reasons, applicants respectfully submit that their invention is patentable over Lehman.

Since Lehman fails to describe, teach or suggest at least one of the following: determining whether a relationship is a reference-based relationship; determining whether a relationship is a containment-based relationship; locking at least one resource using one type of locking strategy, in response to the determining indicating the relationship is a containment-based relationship; and locking at least one resource using another type of locking strategy, in response to the determining indicating the relationship is a reference-based relationship, applicants respectfully submit that Lehman does not describe, teach or suggest one or more aspects of applicants' claimed invention. Thus, applicants respectfully submit that claim 1 and the other independent claims are patentable over Lehman.

Further, applicants respectfully submit that the dependent claims are patentable for the same reasons as the independent claims, as well as for their own additional features. For example, dependent claim 49 explicitly recites that the one type of locking strategy comprises a chained locking strategy and the another type of locking strategy comprises a reference-based locking strategy. Neither of these strategies, as claimed, is described, taught or suggested in Lehman or in any of the other references, either alone or in combination. Thus, applicants respectfully submit that dependent claim 49 is patentable over the cited references.

Additionally, the other cited references do not overcome the deficiencies of Lehman. For instance, Soltis fails to mention different types of relationships and does not differentiate between different types of relationships. There is no discussion in Soltis of whether a

relationship is a containment-based relationship or a reference-based relationship. This is not discussed in Soltis. Thus, Soltis does not make any determination as to the type of relationship, as claimed by applicants.

Moreover, since Soltis fails to teach or suggest determining whether a resource has a containment-based relationship or a reference-based relationship, it follows that Soltis does not describe, teach or suggest locking at least one resource of the one resource and the another resource using one type of locking strategy, in response to the determining indicating the relationship is a containment-based relationship, or locking at least one resource of the one resource and the another resource using another type of locking strategy, in response to the determining indicating the relationship is a reference-based relationship. There is no analysis in Soltis of determining the type of relationship of a resource to be locked (i.e., whether it is containment-based or whether it is reference-based), and then selecting the locking strategy based on that determination. Soltis does not even mention containment-based relationships or reference-based relationships, much less make any decisions based on such relationships. Thus, applicants respectfully submit that Soltis does overcome the deficiencies of Lehman.

Since neither Lehman nor Soltis describes, teaches or suggests at the very least one or more of the following: determining whether a relationship is a containment-based relationship or whether it is a reference-based relationship; locking at least one resource of the one resource and the another resource using one type of locking strategy, in response to the determining indicating the relationship is a containment-based relationship; and locking at least one resource of the one resource and the another resource using another type of locking strategy, in response to the determining indicating the relationship is a reference-based relationship, the combination also fails to teach or suggest these claimed elements. Neither Lehman nor Soltis makes any mention of locking a resource using a locking strategy that depends upon whether a determined relationship is a containment-based relationship or a reference-based relationship. This is missing from both references, and therefore, from the combination, as well. Thus, for at least these reasons, applicants respectfully submit that their invention is patentable over the combination of Lehman and Soltis.

As further examples, neither Shaughnessy nor Annevelink describes, teaches or suggests at least applicants' claimed elements of determining whether a relationship between one

resource and another resource of a data repository is a containment-based relationship or a reference-based relationship, and locking at least one resource using one type of locking strategy, in response to the determining indicating a containment-based relationship, and locking at least one resource using another type of locking strategy, in response to the determining indicating a reference-based relationship. Since each of the applied references fails to describe, teach or suggest at least these claimed elements, applicants respectfully submit that the combination (*assuming arguendo* the combination is proper) also fails to describe, teach or suggest one or more of these claimed elements.

Moreover, applicants respectfully submit that the combination of Lehman and any of the applied references is improper. For example, there is no teaching or suggestion in the references themselves to make the combination or modification suggested in the Office Action. It is well known that:

> It is insufficient to establish obviousness that the separate elements of the invention existed in the prior art; absent some teaching or suggestion, in the prior art, to combine the elements. Arkie Loures Inc. v. Gene Lareau Tackle Inc., 43 USPQ 2d 1294, 1297 (Fed. Circ. 1997)

The justifications provided in the Office Action do not indicate where the references expressly teach the combination. For at least this reason, the combinations are improper.

Based on the foregoing, applicants respectfully submit that the combinations of Lehman and any of the applied references are improper, and even if proper, the combinations do not teach or suggest at least one or more of applicants' claimed elements.

For all of the above reasons, applicants respectfully request an indication of allowability for all claims pending herein.

Should the Examiner wish to discuss this case with applicants' attorney, please contact applicants' attorney at the below listed number.

Respectfully submitted,

Blanche E. Schiller

Blanche E. Schiller
Attorney for Applicants
Registration No.: 35,670

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HESLIN ROTHENBERG FARLEY & MESITI P.C.
5 Columbia Circle
Albany, New York 12203-5160
Telephone: (518) 452-5600
Facsimile: (518) 452-5579